

REMARKS

The Invention

This invention relates to high pressure gas cylinders and, more specifically, to aluminum cylinders having a plastic interior coating. It has been determined that when a composite/aluminum cylinder is combined with a plastic coating, the total weight of the cylinder is reduced, compared with the all metal cylinders, and the cycle life is significantly extended over that achievable by the base designs. More specifically, it has been found that use of the plastic coating on a composite/aluminum cylinder increases the cycle life of a cylinder between about 50% to 150%.

The aluminum/composite/plastic cylinder is a lightweight, thin-walled cylinder containing an interior plastic coating that is heat-bonded to the aluminum. The aluminum liner is surrounded by a composite outer wrap, typically carbon or aramid and fiberglass filaments held within an epoxy resin matrix. The cylinder is designed to contain gas ranging in pressure from 500 to 10,000 psi. The cylinders, typically, range in volume from 0.5 to 500 liters. Such cylinders are especially adapted to be used as a self-contained breathing apparatus, a home oxygen therapy cylinder, a commercial aviation cylinder, a fuel storage cylinder in natural gas and hydrogen vehicles, and with military and aerospace applications.

Status of the Claims

Claims 1-16 are pending in the application.

Claims 1, 2, 6-9 and 14-16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Haldenby*, U.S. Patent No. 5,474,846 in view of *Seal et al*, U.S. Patent No. 5,822,838.

Claims 3-5 and 10-13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Haldenby* in view of *Seal* and further in view of *Luttmann et al*. U.S. Patent No. 6,244,020.

Claims 1, 2, 6-9 and 14-16; Rejected Under 35 U.S.C. § 103(a)

Claims 1, 2, 6-9 and 14-16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Haldenby*, U.S. Patent No. 5,474,846 in view of *Seal et al*, U.S. Patent No. 5,822,838. *Haldenby* discloses the use of a plastic coating on the inner side of a steel cylinder. More specifically, *Haldenby* discloses a method of applying

the plastic coating and identifies various types of plastics that may be utilized. As for the actual cylinder, *Haldenby* simply discloses the use of “standard steel” (Col. 2, line 38) and “stainless steel” (Col. 3, line 1). *Haldenby* does not mention the use of an aluminum cylinder.

Seal discloses a thin metal lined, composite overwrapped pressure vessel. That is, a metal cylinder with an outer composite layer. The metals identified as part of the *Seal* invention are titanium alloys, including the common Ti-6Al-4V alloy. In the prior history portion of the disclosure, *Seal* further mentions aluminum-lined composite wrapped tanks. Col. 1, lines 39-44. *Seal* further indicates that a protective coating may be applied to the composite wrap. Col. 9, line 14. *Seal* does not, however, disclose the use of a coating on the inner surface of the metal shell.

Accordingly, the Examiner has identified one reference that discloses the use of a plastic coating on the inner side of a metal shell (*Haldenby*) and another reference that discloses an aluminum shell having a composite wrap (*Seal*). The Examiner has further stated that, “[i]t would have been obvious to add the overwrap [of *Seal*] to reinforce the shell [of *Haldenby*] and make it capable of withstanding higher internal pressures,” and, “[i]t would have been obvious to modify the metal of the shell to be aluminum to provide a metal of high strength to weight ratio to make the cylinder lighter for aerospace and rocket applications.” The Examiner has not, however, indicated where the references teach or suggest such a combination and, as such, the Examiner has not presented a *prima facie* case of obviousness.

That is, in this rejection the Examiner has simply identified separate references wherein each reference discloses separate elements recited in the claims of the present application. The standard used by the Examiner has been explicitly rejected by the courts and by the U.S. Patent and Trademark Office. As set forth in MPEP §2143.03 III, “[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.” *Id.* citing *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Moreover, as stated in, *In re Geiger*, 815 F.2d 686, 2 USPQ2d 1276 (Fed. Cir. 1987), “obviousness cannot be established by combining teachings of the prior art to produce the claimed invention, *absent some teaching, suggestion, or incentive supporting combination*” (emphasis added). Put another way, “the mere fact that disclosures or teachings of the prior art can be retrospectively combined for the purpose of evaluating obviousness/nonobviousness issue does not make the combination set forth

in the invention obvious, *unless the art also suggested the desirability of the combination*” *Rite-Hite Corp. v Kelly Co.*, 629 F.Supp. 1042, 231 USPQ 161, *aff’d* 819 F.2d 1120, 2 USPQ2d 1915 (E.D. Wis. 1986) (emphasis added). Similarly, the court in, *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991), stated that “both the suggestion [to make the claimed apparatus] and the reasonable expectation of success must be found in the prior art, not in the Applicants’ disclosure.” Here, there is no suggestion that the cited references should be combined. As such, the combination of these references would not be obvious to one skilled in the art.

Independent Claim 1 recites a gas cylinder comprising an aluminum shell having an outer side and an inner side defining a storage space, a composite wrap disposed about the aluminum shell, and a plastic coating disposed on the inner side. As these references cannot be combined under 35 U.S.C. § 103(a) and as the individual references fail to disclose a gas cylinder comprising an aluminum shell having an outer side and an inner side defining a storage space, a composite wrap disposed about the aluminum shell, and a plastic coating disposed on the inner side, the rejection of Claim 1 under 35 U.S.C. § 103(a) is improper and should be withdrawn.

Claims 2, 6 and 7 each depend from Claim 1 and rely on their dependency for patentability.

Independent Claim 8 recites a cylinder assembly comprising a valve, an aluminum shell having an outer side and an inner side defining a storage space, a composite wrap disposed about the aluminum shell, and a plastic coating disposed on the inner side. As these references cannot be combined under 35 U.S.C. § 103(a) and as the individual references fail to disclose a cylinder assembly comprising a valve, an aluminum shell having an outer side and an inner side defining a storage space, a composite wrap disposed about the aluminum shell, and a plastic coating disposed on the inner side, the rejection of Claim 8 under 35 U.S.C. § 103(a) is improper and should be withdrawn.

Claims 9 and 14-16 each depend from Claim 8 and rely on their dependency for patentability.

Accordingly, the rejection of Claims 1, 2, 6-9 and 14-16 under 35 U.S.C. § 103(a) as being unpatentable over *Haldenby* in view of *Seal* is improper and should be withdrawn.

Claims 3-5 and 10-13; Rejected under 35 U.S.C. § 103(a)

Claims 3-5 and 10-13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Haldenby* in view of *Seal* and further in view of *Luttmann et al.* U.S. Patent No. 6,244,020. The deficiencies of *Haldenby* and *Seal* are discussed above. *Luttmann* discloses a process for producing a filled, sealed, and sterilized container that may be opened without the use of a tool. The container has a “weakening” at the “lid” wherein the container is structured to rupture upon the application of force. Such a container would, presumably, be used for food or medicines. The *Luttmann* container is not a high pressure device. As such, *Luttmann* is non-analogous art.

As set forth in MPEP §2141.01, “[i]n order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned.” *Id.* citing *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). Here, the invention is in the field of high pressure gas cylinders. Such cylinders are especially adapted to resist internal pressures of hundreds or thousands of pounds of pressure per square inch. To accommodate such pressures, fluids are transferred in and out via a valve assembly. Such containers do not have “weakenings” formed therein and do not use “lids” to seal the container. As such, one skilled in the art of high pressure cylinders would not review a reference addressed to a container that may “be opened without the aid of a tool.” Accordingly, one skilled in the art of high pressure cylinders would not turn to *Luttmann* and, as such, *Luttmann* is non-analogous art.

Further, as set forth above, to support a combination of references under 35 U.S.C. § 103(a), the Examiner must indicate where in the cited references there is a teaching, suggestion, or incentive supporting the proposed combination. Again, the Examiner has merely stated that *Luttmann* could be combined with the other cited references, but has not shown that there is a teaching, suggestion, or incentive supporting the proposed combination.

Claim 3, which depends from Claim 2, recites a gas cylinder comprising an aluminum shell having an outer side and an inner side defining a storage space, a composite wrap disposed about the aluminum shell, and a plastic coating disposed on the inner side, wherein the coating is a heat bonded polyethylene copolymer. As these references cannot be combined under 35 U.S.C. § 103(a) and as the individual

references fail to disclose a gas cylinder comprising an aluminum shell having an outer side and an inner side defining a storage space, a composite wrap disposed about the aluminum shell, and a plastic coating disposed on the inner side, wherein the coating is a heat bonded polyethylene copolymer, the rejection of Claim 3 under 35 U.S.C. § 103(a) is improper and should be withdrawn.

Claims 4 and 5 depend, directly or indirectly, from Claim 3 and rely on their dependency for patentability.

Claim 10, which depends from Claim 9, recites a cylinder assembly comprising a valve assembly, an aluminum shell having an outer side and an inner side defining a storage space, a composite wrap disposed about the aluminum shell, and a plastic coating disposed on the inner side, wherein the coating is heat bonded polyethylene copolymer. As these references cannot be combined under 35 U.S.C. § 103(a) and as the individual references fail to disclose a gas cylinder comprising a valve assembly, an aluminum shell having an outer side and an inner side defining a storage space, a composite wrap disposed about the aluminum shell, and a plastic coating disposed on the inner side, wherein the coating is a heat bonded polyethylene copolymer, the rejection of Claim 10 under 35 U.S.C. § 103(a) is improper and should be withdrawn.

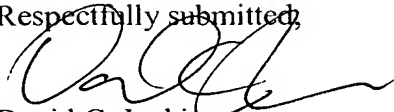
Claims 11 and 12 depend, directly or indirectly, from Claim 10 and rely on their dependency for patentability.

Accordingly, the rejection of Claims 3-5 and 10-13 under 35 U.S.C. § 103(a) as being unpatentable over *Haldenby* in view of *Seal* and *Luttmann* is improper and should be withdrawn.

CONCLUSION

In view of the remarks above, Applicants respectfully submit that the application is in proper form for issuance of a Notice of Allowance and such action is requested at an early date.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'D. Jenkins', written over the words 'Respectfully submitted,'.

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